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Open resources for case studies and assignments

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Theme: Open Educational Resources

Abstract

Resources not designed for educational use can be successfully used educationally. For example, publications by bodies such as the United Nations or government departments can be rich resources for case studies and assignments in an educational context. Such resources are often freely available on the web, and so can be considered open educational resources.

The use of this type of resource for case studies and assignments is considered in the context of two related level-3 modules (final year undergraduate) produced by the UK Open University. Both modules are concerned with digital technology, and both situate the technology in a wider social context. Both courses are also concerned with developing students' skills of independent investigation.

The prime benefits of this type of resource are shown to be their authenticity and authority. In using these resources, students are dealing with materials that are often produced and used by professional practitioners. However, there are potential pitfalls: students often need a great deal of help to make good use of these resources, and the resources are liable to change or disappear from the web unpredictably.

The paper concludes that using this type of open educational resource should not be seen as a time-saver or an easy option for course designers. Instead, as with other open educational resources, using these resources can present course designers with problems of location, selection and incorporation. That is, where can suitable resources be found, which parts can be used successfully, and how can these resources be incorporated into resources created by the course designers themselves?

Keywords

open educational resources, online education, digital communications, media technologies

Introduction

The 'open' resources we are concerned with in this article are documents typically produced by specialist institutions, for example:

Government departments

Regulatory bodies, for example, the UK's Ofcom, or the International Telecommunication Union

Public corporations, for example in the UK the BBC

United Nations organisations, such as UNESCO

Private companies

Standards bodies, for example the Bluetooth Special Interest Group, or 3rd Generation Partnership Project (3GPP) which sets standards for third generation mobile telecommunications

Charities

Academic and cultural organisations

Organisations such as these often publish reports, white papers and research findings freely on line. We consider that such resources have considerable educational potential, and give some examples of their use in an educational context. Whether these resources are truly 'open educational resources', however, is a moot point. Duval and Wiley (2010), paraphrasing a UNESCO definition from 2002, say that 'open educational resources are learning objects that use an open source license.' Duval and Wiley's reference to 'learning object' emphasises an educational intent behind open educational resources, whereas the resources discussed here generally have no such intent, although they are usually intended to be informative. Atkins et al. (2007, p. 4; quoted in Lane and McAndrew, 2010, p. 954), while allowing that many types of resource may count as open educational resources, specify that they be issued under 'an intellectual property license that permits their free use or re-purposing by others.' That would disqualify resources covered by ordinary copyright law, as are most of those we are concerned with in this paper. Our preferred definition, courtesy of Clements and Pawlowski (2012, p. 5), includes 'all resources for the purpose of learning, education, and training that are freely accessible,' to which we would add that whether a resource is 'for the purpose of learning' is less a property of the resource than of the way it is used, as we hope to show here.

By themselves, resources produced by bodies such as those listed above generally do not make satisfactory teaching material (although very exceptionally they may). Sometimes they assume a high level of prior knowledge, and sometimes the writing style is too poor to inflict on students whose own writing skills might not be high. The most satisfactory use of these materials, we suggest, is as a complement to teaching material, typically as case studies or as the basis for assessment activities. For example, assignment questions might be set whose answers can be found in a document of this type. Alternatively, students might be asked to comment or reflect on a document (or part of one). Such activities can be designed to test students' abilities to justify their answers in terms of the evidence within the source. This type of 'close reading' activity is well established in the humanities, but less so in other disciplines.

Depending on the type of course into which these materials are incorporated, locating the resources themselves can be made part of an activity. Students might be asked to evaluate the

quality of the resource they have found, and maybe to compare and contrast it with a different resource. Again, the crucial skill here is for the student to be able to justify their claims with evidence taken from the document or from the circumstances of its publication (for example, whether it is likely to have been refereed or not). Such activities can be positioned as preparation for project work or other research work.

Authenticity, authority and topicality

Apart from their zero cost and easy availability (assuming a satisfactory internet connection), a primary virtue of these resources is their authenticity. In using these resources, students are often using the very materials used by practitioners. Two of the authors of this paper have written elsewhere of the value of authentic software tools in an educational context (Jones and Bissell, 2011). When the resources are documents produced by key institutions, students experience for themselves the approaches, formats, styles, and, quite often, shortcomings of practitioners' resources. Although this has educational value in itself, it often means that students need help to get the most out of materials that were intended for a different readership. Such assistance could take the form of commentaries, glossaries, overviews and summaries. For the educator, preparing this help this can be a significant amount of work.

Two other potential virtues of this type of resource should be mentioned. One is authority. For example, documents produced by government or United Nations statistical departments are likely the most authoritative available. Similarly, documents produced by standards bodies tend to be authoritative because their documents specify the standard, and what is required for compliance with it. Again, students will often need assistance if they are to benefit from using these resources. Another potential virtue is topicality. In quickly changing subjects such as technology, publications from a relevant standards body, for example, can be a way to keep a course topical.

We now discuss the use of these types of resource in two UK Open University level 3 modules.

T324 Keeping Ahead in Information and Communication Technology

T324 *Keeping Ahead in Information and Communication Technology* is a 30 point, nine-month module, presented annually. It was first presented in 2007, and its major aims are:

1   to introduce students to the fundamental principles of wireless ICT systems
2   to enable students to become much more independent learners, able to keep up to date in the ICT field
3   to improve students' understanding of the complexities of large-scale ICT systems involving not only technologies but also people, institutions and organisations

The module makes extensive use of third-party resources not only to keep the learning material up to date, but also to teach high level (undergraduate) skills in researching new topics and evaluating the authority of the resources identified. Some of these third-party resources are the type of 'open' resource referred to earlier; other resources might be, for example, journal articles available online via the University Library. Learning outcomes in these areas include:
  * understand the structure of a typical specialist document dealing with an ICT topic
  * be able to evaluate critically a range of resource materials originating from third parties, including news items and general interest publications

- be able to locate useful information in, and extract it from, highly technical documents including journal articles, product information, websites, etc.
- be able to cite and reference appropriately in their written work the information retrieved
- be able to learn independently from such materials, in order to keep up to date in ICT.

The module is structured into three blocks. The first introduces students to the fundamentals of wireless communication, and the learning materials consist mainly – although not entirely – of components produced by the OU Module Team. The second block is devoted predominantly to developing the skills of resource searching and evaluation, based on the topic of wireless sensor networks (WSNs). For this block students work extensively with materials *not* developed by the Module Team. The final block is devoted to the topic of ICTs in context, in particular (a) systems failures in ICT and (b) ICTs in the developing world, and is a mix of OU-generated and open and third-party resources.

The major use of an open resource in the Block 1 teaching is a publication by the UK communications regulator Ofcom – *The Spectrum Framework Review* (Ofcom, 2004). This is a discussion document, published by Ofcom to initiate discussion within the telecommunications industry about how the UK's radio spectrum should be managed. Part of its educational value, therefore, lies in its authenticity as a demonstration of a regulator's role, and how a regulator interacts with interested parties. Students are required to read a short extract from the document, and discuss aspects of proposed spectrum allocation.

The written assignment for Block 1, like all other assignments, changes each year. Often the assignment contains questions on topical issues in technology. For example, in the 2012 presentation, the assignment required students to study parts of another Ofcom document, *The Spectrum Plan for the London 2012 Games* (Ofcom 2012), which was concerned with spectrum provisions to meet the huge, localised demand for wireless communications during the Olympic Games in London in August 2012. By working through the assignment, students should have come to appreciate the enormous complexity of the technical infrastructure of modern public events such as the Olympic Games, and the vulnerability of communication systems to unexpected interference. Students may have been reminded of this assignment when, in the early days of the games, newspaper headlines reported that intensive use of mobile phones by spectators, for tweeting and social networking, during a cycle race through London had jammed the GPS signals that broadcasters relied on for second-by-second location information on the cyclists.

Block 2, as noted above, exploits open resources extensively – as well as resources that are certainly not open to everyone, but which are 'free' to OU students by virtue of institutional subscriptions (such as the huge publication databases of the *Institute of Electronics and Electrical Engineers*, the *British Computer Society* and the *Association for Computing Machinery*). During their study of the block, students learn how to use such databases effectively, in the context of investigating the topic of WSNs. The written assignment for the block adopts a similar approach. A major part of it involves students locating three resources, given incomplete information about them – typically an academic journal article, a conference paper and some manufacturer's literature or similar. They are then required to give a critical summary and evaluation of the documents, including an assessment of the documents' authority based on content, provenance, and information about authors and their affiliations derived from institutional and personal websites.

Block 3 consists of two distinct parts. The teaching material of the first part looks predominantly at ICT system failures, in order to teach elements of the systems approach to such complex socio-technical environments. The block draws upon a UK Department for Transport (2007) publication *Public Transport Information*, as well as a UK National Audit Office (2004) report *Tackling Congestion by Making Better Use of England's Motorways and Trunk Roads* and a report commissioned by the UK government entitled *The Eddington Transport Study* (HM Treasury, 2007). While these publications are certainly authoritative, they are not uncontroversial, and students are expected to engage critically with them. In the second part of the block, dealing with ICT in the developing world, use is made of World Bank and International Telecommunication Union data on average income and mobile phone penetration.

As in Blocks 1 and 2, the assessment of Block 3 uses open resources as case studies or as data sources to underpin a written assignment and to maintain currency of the teaching. Frequently the case study in the assessment is based on a major ICT project that has made the national headlines, often as a consequence of failure. For example, part of the assessment in 2009 explored the failure of C-NOMIS, the UK's National Offender Management Information System, using material from a National Audit Office (2009) report. Assessment in 2010 was based on, among other things, a Factsheet produced by the UK government's Department for Education and Skills (DfES, 2007) and the *Children's Social Care Services, Core Information Requirements Process Model* from the Department for Health and Social Security (DHSS, 2008). These documents were supplied as background for students' discussion of the Integrated Children's System. This IT system for supporting children in need and their families was introduced in the UK following a high-profile failure to protect a child some years earlier (the 'Baby P' case, in which an infant died) and had been recently receiving some negative publicity. In 2011 students were asked to explore one aspect of the developing (and in some quarters, controversial) nationwide IT infrastructure of the National Health Service, the Care Records System, but in this case the background information consisted of news reports and academic publications rather than open resources.

T324 was not designed with the explicit aim of exploiting open educational resources. Nevertheless, its major objective, of equipping students with the skills to enable them to 'keep ahead in ICTs' in a critically informed manner, meant that such resources were used widely in its design, production and presentation. The experience of producing this module influenced the development of what can be considered as a 'companion' module (with many of the same Module Team members), first presented two years after T324's first presentation, and considered in the following section.

T325 Technologies for Digital Media

T325 sits alongside T324 in the curriculum with many students studying both modules, either at the same time or consecutively. Like T324, T325 is a 30 point, nine-month module, presented annually. It was first presented in 2009.

Although it is not a formal requirement, there are advantages to the student to study T324 before T325 if they are not studied simultaneously. This is because although both modules make extensive use of third party material, T324 has more teaching on how to find and use external material than T325.

The five stated aims of T325 are:

1   to introduce students to the fundamental principles of selected technologies for digital media

2   to enable students to become more independent learners, able to keep up to date in digital media technologies

3   to enable students to integrate knowledge from several sources in the presentation of an argument

4   to enable students to analyse, critique and synthesise examples of third-party material

5   to improve students' understanding of the complexities of technological systems in terms of social, ethical and economic factors as well as the underlying technologies.

Although only the fourth of these makes explicit reference to third party material, such material contributes to them all to a some extent (substantially so for second and fifth; less so for first).

As with T324, this module is structured into three Blocks.

The first block, *Enabling technologies*, is an intensive study of the technologies used in Digital Media, covering hardware, such as disc drives, solid state (e.g. flash) memory, batteries, display screens and capture devices, and algorithms, such as error control coding and MPEG compression techniques. The emphasis of this first block is on the first of the aims listed above, and is largely presented using text and teaching software produced in-house by the Open University. Even for this block, however, external resources are important. For example, the effect of Giant Magnetoresistance (GMR), used for high-capacity hard-drives, is introduced using free resources from the website of the Nobel Foundation (the discoverers of GMR were award the Nobel Prize in 2007). Students are pointed to two documents: one, *Information for the Public* (Royal Swedish Academy of Sciences, 2007a), is aimed at non-specialists and is therefore a useful introduction to the science and technology of GMR; the other, *Scientific Background* (Royal Swedish Academy of Sciences, 2007b), contains much more detailed science, and T325 students are not expected to study this document in great detail. Directing students to these papers simultaneously introduces them to the technology and provides an example of the sources available to them for independent study. Other free external resources used by this block are technology white papers, standards documents and product specifications. Product specifications are particularly valuable for assignment questions, since new products are appearing all the time and presenting students with the data sheet of, for example, a new flash memory device, reassures them that their study is relevant to the latest technology.

The second block, *Intellectual Property and Security Issues*, makes much more extensive use of third-party materials, and explicitly addresses all five of the module aims. The printed teaching text supplied to students is only half the size of that of Block 1 (128 compared to 256 pages), but students are in addition supplied with a 44 page booklet of articles containing academic papers and an extract from the 2006 *Gowers Review of Intellectual Property*, published by Her Majesty's Treasury (HM Treasury, 2006). Students are also directed to material online, including newspaper articles, further academic papers, the full text of the Gowers Review and some commercial resources.

Assignments testing Block 2 deliberately draw upon a range of resources in order to address the third and fourth aims listed earlier. These include the 'permanent' resources of the Block outlined above, but each assignment also presents students with other resources unique to that presentation. For example, the assignment testing Block 2 of the 2012 presentation of the module was based on the 2011 Hargreaves Report: *Digital Opportunity: A review of*

Intellectual Property and Growth (Hargreaves, 2011), available freely from the website of the Intellectual Property Office. Students were directed to specific parts of the report and asked to explain some of the concepts in more detail, based on their study of T325.

Government reports tend to be straightforward text documents, perhaps with some limited graphics, but sometimes commercial organisations make more sophisticated multimedia available, and an example of this is the set of four Microsoft multimedia presentations explaining the Windows Media Digital Rights Management system. These also exemplify the risks of using third-party online material, however, since they disappeared from original location on a Microsoft site in the USA unexpectedly, two years into the life of T325. Fortunately, the module team eventually tracked down copies of them on a Korean Microsoft site (Microsoft, n.d.).

Block 3, *Mobile broadband*, also contains a mixture of material produced by the Open University and third-party resources. The Block describes developments designed to support broadband applications, and makes use of freely available White Papers such as those from 3GPP: the 3rd Generation Partnership Project. During the development of new standards, especially those that emerge from the collaboration of a range of different organisations, it is common to find that examples like this of White Papers that explain aspects of the technology to a general technical audience. The standards themselves are also often openly available and it is useful to expose students to short extracts from standards, but they are usually too detailed and too specialised to be used for teaching. White Papers provide a valuable bridge between the standard and the topics of the module.

Overall, there is so much use of third party material in T325 that it can be seen to be embedded in the 'outside world' in way which would have been impossible a few years ago. By drawing on the most recent resources, the module can be seen to be up to date. Since the credibility of any teaching on digital media would be fatally undermined if students perceived the module to be out of date, this is a far from trivial issue. Even apparently minor details such as a photograph of a device a couple years old can tarnish the perception of a module, so in addition to the benefits outlined above, there is also a cosmetic benefit that is not 'merely cosmetic'.

Conclusion

We have outlined some of the ways in which freely available non-educational resources can be used educationally in case studies and assignments. The uses we have described would be equally viable with conventionally published third-party materials, such as journal articles and books which are not distributed freely, of course. There is, indeed, a long tradition of conventionally published documents being used in the ways we have described (and T324 and T325 do use conventionally published articles as well as freely available sources). Fortunately, it is worth noting that the increasing availability of such facilities as Google Scholar and open research repositories, as well as the move towards 'open' academic publishing of one form or another, means that traditional academic journal publishing is increasingly becoming available free of charge to users (if not to the authors or their paymasters). Educators without privileged access to extensive, paid-for, resources of organisations such as the IEEE (Institute of Electrical and Electronics Engineers), BCS (British Computer Society) or ACM (Association for Computing Machinery) can thus adopt a similar approach to teaching and learning using freely available academic resources.

'Open', or freely available, resources are potentially interesting to educators not only because of their zero cost, however. The relative ease of access to these materials makes it practical to use them in modules, especially where student numbers are high. Also, the relative ease of online publishing and distribution has led many organisations to view the internet as a primary means of dissemination. This means that the range of potentially useful resources has expanded enormously. So too has the range of poor or useless resources. For the student or educator, winnowing the good from the bad is now a vital skill.

As with using any third party materials, there can be considerable effort for the educator in finding suitable materials (and in locating alternatives if a resource disappears, as happens not infrequently with free material). These resources should not be regarded as a quick or easy way to create a teaching module. Indeed, the justification for using them should be based on the benefit to the student, rather than the educator. Among these benefits are the ones cited earlier of authenticity, authority and (potentially) topicality. An incidental benefit is offering students an insight into the huge range of resource available nowadays. Although benefits to the student must be placed uppermost, as educators we have found that the research necessary for locating suitable materials has proved an effective way of keeping ourselves up-to-date with developments in our specialist topics.

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